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ABSTRACT

The processes by which the young child recognizes and regenerates some invariant and organizational properties of language are discussed. In these processes the child conjoins and contrasts recurrent segments--perhaps a recurrent word--of the messages presented to him. After repeated exposure to messages containing a common segment, the child recognizes the invariant segment. Both the identification of meanings and the formation of classes can be explained on this basis. In the first section, language acquisition is discussed as an unadulterated process of activities with little consideration for the products and structures generated. Linguistic operations are compared with those in economy through the comparison of three stages in the development of monetary systems--the barter system, the coinage system and the debenture system--with three stages in the origin, development and study of language--the proto-language, the token language, and the interaction language. It is argued that the intellectual processes involved are roughly comparable to Piaget's three stages of cognitive development--the periods of sensory-motor activity, concrete operations and formal operations. In the second section, the acquisition of the semantic and syntactic organization of language is emphasized. All these acquisitions succeed through active operations by the child with and upon the relational information given. These operations consist of intersecting or composing, conjoining or aligning relational information. (Author/KM)

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LANGUAGE AS LABOR: SEMANTIC ACTIVITIES AS THE BASIS FOR LANGUAGE DEVELOPMENT

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Language as Labor: Semantic Activities as the Basis for Language Development

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Most inquiries into early child development emphasize the undifferentiated state of the organism and his embeddedness in the environment. Development, subsequently, is considered as a differentiation of objects and, more basically, of the subject from the object. In accepting such an interpretation--and what choice is there?--it becomes apparent how inappropriate a stimulus-response theory would be. Stimuli and responses do not yet exist as separate conditions; they need to be differentiated before any acquisition based upon them can be explained. Similarly, associations cannot connect stimuli and responses according to their contiguity, frequency, or recency; everything is connected anyhow. The first task for the child is to recognize some constancies in the flux of his sensory impressions and in the shifts of his motoric expressions.

Many cognitive and philosophical psychologists have provided interpretations of early development similar to the one attempted here. Most notably, Heinz Werner (1926) has elaborated the early differentiation (and concurrent integration) of the child's experiences, and Piaget (1963), likewise, has explicated processes leading to schemata of perceptions and actions.

In focusing upon Piaget's work, we will compare his interpretation of cognitive development with the early acquisition of language and meaning. In both cases, the child is confronted with a flux of events and his main developmental task consists in recognizing constancies in the flux of his impressions and invariances in the stream of his expressions. Only after

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these constancies and invariances have been recognized and practiced can learning in the traditional sense be considered as a means for acquisition.

In spite of similarities in the goals of cognitive and language development, the task of recognizing constancies in the general physical environment and of invariances in the more specific sound and speech environment points toward basic differences which might have prevented any mutual benefit or a simple consolidation of both interpretations. The former constancies might be regarded as synchronic-spatial structures (with the supplementary option of temporal shifts and changes); the latter invariances have to be regarded as diachronic-temporal structures (with the rather advanced technological option of fixating them in space through written transformations or on magnetic tape).

Of course, such a contrast overemphasizes the differences. The constancies of objects in space may represent stable states during short periods of time only; the objects change and move. Moreover, the subject through his own movements creates for himself continuously changing impressions of these "stable" objects. When, on the other hand, a person perceives an invariant section within a speech sequence, for example a word, his percept will activate a conceptual field (Trier, 1931) or network (Quillian, 1967; Riegel, 1968; Riegel & Riegel, 1963) representing his past experiences related to this word. Thus, a synchronic structure is brought to his attention, often identified with the subjective semantic organization of the language. As subsequent units are perceived by the listener, other semantic structures are called upon blending into one another and modifying the earlier structures. The sequential progression across synchronic semantic structures represents

the diachronic organization of the language which has been identified with its syntactic order. Because of the sequential blending of the synchronic structures, the distinction between both organizations, again, overemphasizes their differences at the expense of their similarities.

The above distinction, furthermore, holds only for an individual who has already acquired a fair amount of perceptual-cognitive and linguistic experiences. The young child has to generate, first, these semantic and syntactic orders. Of course, we do not wish to neglect the fact that the language of the environment as well as the general physical surrounding already possess a high degree of segmentation and structure. These are either properties of nature (such as the formation of rocks, mountains, plants, animals, including the human organs for cognition and speech) or, more importantly, have been generated through human efforts (such as rooms, buildings, cities, social organizations, language). Students of learning and association have systematically neglected the structural properties of the world and pretended as if the child were born into a random world of chaos.

The young child has not yet experienced these outer structures. His development, essentially, consists of recreating these outer organizations through his own activities and on the basis of his own, inner structures. At the same time, these outer organizations will be induced upon him through the efforts of the group of people around him. This group does not only include all persons who are attending him, but the whole contemporary and, in the end, all previous generations who laid the foundation and are continuously creating the physical and social world in which the child grows up. The child through his own activities also partakes in changing this world, at

least those sections that are experienced by the persons in his immediate social environment, i.e., his parents, siblings, neighbors, etc. Indeed, the child's activities might produce more dramatic changes in his parents, for example, than the parents are able to produce in the child.

In the following presentation, we outline the processes by which the child recognizes and regenerates some invariant and organizational properties of language. In these efforts, the child will conjoin and contrast recurrent segments of the messages presented to him. For example, the child might hear sequences such as "Drink your milk," "The milk is too hot," "We have to buy some milk," etc. After repeated exposure to such messages, the child recognizes invariant segments, for example the word MILK. Using a visual analog, we might think of these statements as written upon strips of paper; the child would then bundle these strips together with the invariant segment at the intersection. As we will attempt to show, both the identification of meanings as well as the formation of classes can be explained on this basis.

Similar arguments can be made for operations at the phonetic level leading to the recognition of the phonemes of the given language. While phoneme recognition will be consciously activated only through the intervention of teachers, the recognition of meaningful units, such as words, may be initiated by the child himself. Recognition and transmission of meanings is, after all, the main purpose of language. These operations, furthermore, are not bound to smallest elements, such as letters, syllables or words, but involve more complex units as well, such as phrases, parts of sentences and, perhaps, whole sentences and expressions. The acquisitions of their units

are fused with syntactic developments which cannot and should not be separated from those of semantic structures.

In the second part of the following presentation, we emphasize the acquisition of words, classes, class relations and, generally, of the semantic and syntactic organization of language. The basis for these developments are contextual segments whose smallest units we will call simple relations. All of these acquisitions succeed through active operations by the child with and upon the relational information given. These operations consist in intersecting or composing (as well as decomposing), conjoining or aligning (as well as separating) of relational information.

We are not able to explain much further how these operations originate in the child. But in the first part of our presentation, we will discuss language acquisition as an unadulterated process of activities with little consideration for the products and structures generated. In particular, we compare linguistic operations with those in economy by describing three stages in the development of monetary systems: the barter system, the coinage system, and the debenture system. Similarly, we will delineate three levels in the origin, development, and study of language: the proto-language, the token language, and the interaction language. Tangentially, we will also argue that the intellectual processes involved are roughly comparable to three stages of cognitive development as originally proposed by Piaget: the period of the sensory-motor activity, the period of concrete operations (including the subperiods of preoperational and concrete operational thinking), and the period of formal operations.

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Monetary and Linguistic Systems: A Developmental and Historical Comparison

The relationship between goods or merchandise and the labor or activities necessary to produce them has been regarded, at least since Marx (1891), as dialectic: labor that does not produce something is futile; goods that are not produced by labor are miracles. In the following discussions we equate labor with the acts of producing or perceiving speech; merchandise with speech products, such as sentences, words, or speech sounds. Through acts of speech a person increases the individual and collective repertoire of linguistic products. This repertoire is comparable to capital in the economic sense. Capital is only useful for the individual and the society when it is productive, i.e., when it is transformed into new labor, speech acts. Traditionally, linguists have regarded language as commodity but not as labor.

The barter system and the proto-language. Our monetary system originated from the one-to-one bartering trade in simple hunting and farming societies. A social situation in which one participant exchanges, for instance, a sheep or a pig against a certain amount of grain or wool seems to have few similarities with a situation of linguistic exchanges. The items traded do not have any representational or symbolic value but serve to satisfy direct needs of the persons participating in the exchange. Basic similarities become apparent, however, once we realize that languages also are systems of social interactions in which not the objects but rather the labor that leads to their creation and possession is exchanged. Strictly speaking, objects do not play an essential role in such an exchange. Where would they come from, how would they be generated except through the efforts of the participating

individuals? It is the labor involved in raising or catching the animal, in the seeding, tending, and harvesting the crop that is being exchanged. The exchange value is determined by the amount of effort, the diligence of the required skills, and the scarcity of the available resources (which, in turn, need to be acquired and secured through the organisms' efforts).

Many linguists and, especially, psychologists look upon sentences, words, or speech sounds as building blocks or objects of language. But language is basically an activity which, in turn, serves to induce or to provoke activities in others. This comparison is similar to, though not identical with, de Saussure's distinction between la langue and la parole. The former, characterizing the universal properties of language, represents the total repertoire of forms and the structure that has emerged through the efforts of mankind. Surprisingly, as Labov (1970) noted, la langue has been studied by relying on the "linguistic intuitions" of one or a few individuals. A science of parole, though never developed, would have to deal with various speech actions in different social contexts.

Language as an activity reveals itself most clearly under primitive conditions comparable to those of the barter trade. Through grunts, cries, gestures and manipulations, i.e., in Bühler's (1934) terms through "signals" and "symptoms," one participant might induce the other to recognize a danger, to give assistance, or to coordinate activities. The sounds and movements might be recorded as objectifications of such a primitive language by the linguists, but these transcriptions provide only a distorted picture of the needs and intentions or the activities involved. These activities are meaningful in a given situation and in an immediate manner. In the linguist's description their

meaning is bleached; they become abstract and rigidified (see Malinowski, 1923).

Already at this level, language as well as commercial exchanges rely on basic rules. The barter system presupposes property rights. If it is not granted, for example, that the sheep belongs to person A and the grain to person B, no stable exchanges, not even thievery, can take place. In Piaget's sense, this type of commercial activity is comparable to the level of sensory-motor operations. One item is exchanged against another item regardless of the particular shapes in which they happen to be found. Trade does not yet require a knowledge of conservation.

Similarly, proto-linguistic communication presupposes the constancy of expression which, once given, cannot be undone. In this sense they have immediate, existential meaning. Language at the proto-linguistic level is bound to a given situation of high survival but of low symbolic value. Its increase in representational character can be compared to that occurring during the change from a barter to a coinage system.

The coinage system and the token language. (a) When changing from the barter to the coinage system, communities select one of their major commodities as a standard for exchange. In agricultural societies a certain quantity of grain might serve this function, in stock-farming societies the horse, the cow or the sheep. (In ancient Rome, the word for money, pecunia, derives from pecus denoting livestock.)

Shifts in standard commodities indicate the growing diversification of societies. This growth is determined by variations in geographical and

climatic conditions. It has to be brought about, however, by the activities of generations of participating members. Through these activities, society progresses toward more advanced forms of manufacturing and industrial production, and, at the same time, toward a division of labor. Such developments increase the significance of natural resources other than food crops, such as stone, wood, wool, coal, and--most important--metals. Because of their scarcity, compactness and endurance but also because the resources can be easily controlled by the dominating classes of the society, metals soon became the exclusive standard for monetary systems.

The transition from the barter system to a coinage system is not necessarily abrupt (see Cipolla, 1956). After one or a few items have been selected as standard commodities, the exchange continues to proceed as before. When metals are introduced to serve as standards they continue, at first, to fulfill basic needs of everyday life. For instance, metals such as copper, bronze or iron are not only used as currency but the coins also serve as standard weights as well as provide the material for the production of tools and weapons. As the society advances, these common metals are replaced as standards for exchanges by others which are less readily available. Subsequently, smaller and lighter coins can be introduced whose mining, melting, and minting is more easily controlled and which do not serve essential functions for tool making but rather those of luxury and extravagance. For example, in the Roman Empire, bronze coins with a standard weight of 327.45 grams were substituted by much smaller silver and gold coins. Whereas, the amount of metal of the bronze coins had a direct, nonmediated value for the receiver, rare metals, such as silver and gold, lacked such utility. Therefore, refined rules about their use

had to be established by the community; the value of the coins had to be guaranteed by the state through laws which set the standards, determined the metal composition, and regulated their distribution. At the same time, classes of persons, who succeeded in controlling the processing of these rare metals, could set themselves apart as the rulers of their society.

As coins lost their foundation upon the concrete value of commodities but gained in symbolic value, the economy expanded rapidly. At the same time, through the reckless manipulation of a few and through the uncritical trust of many, the changed conditions were selfishly exploited. The emerging histories represent an unending sequence of catastrophies, inflations and devaluations (Gaettens, 1955). Imperialistic expansions (from the Punic Wars to the war in Vietnam) always outpaced the growth of the economic and monetary systems. Since not enough metal could be secured, the silver or gold content of coins was drastically reduced. Subsequently, coins lost rapidly in value until the system had to be replaced at the expense of the working, wage and salary earning population. In spite of these dire consequences, the coinage systems, in comparison to the barter system, offer many advantages which, in particular, shed some light upon similar implications for language systems.

(b) Coinage systems, especially those based upon symbolic rather than pragmatic standards, allow for delayed exchanges, sequential exchanges, and multiple distributions. Delayed exchanges provide the possibility that the seller does not need to convert the items received immediately into other merchandise but may store coins of corresponding value until a better opportunity for a purchase arises. Such delayed reactions are of equal significance in the development of language systems. While the nonlanguage using organism is closely

bound to the here-and-now of a given situation, the use of a language, corresponding in abstraction to the coinage system, does not only allow for more efficient communication but also for better storage, especially once a written code of the language has been invented.

In contrast to the barter trade, exchanges do not need to be limited to two persons interacting at a particular location but sequential exchanges are bound to result. A person who wants to buy a sheep but has no commodities that are of interest to the seller, might reimburse him in coins; the seller, in turn, might approach a third person who is willing to dispose of the desired item. Frequently, the chain will extend over many more than three participants. Coins serve as efficient intermediary, provided that their value is sufficiently safeguarded by social agreements and rules. The social exchange of goods made effective through the invention of coins has similar implications as the invention of verbal codes for linguistic systems. Once a coding system has been adopted, messages can be more reliably transmitted across long sequences of communicating persons than under the more primitive conditions in which utterances are spontaneously but idiosyncratically produced. In a more remote but also more significant sense, the composition of the messages themselves becomes sequential in nature. Linguistic tokens, such as sentences, words, or speech sounds, are ordered into strings. Nonlinguistically encoded action sequences are hard if not impossible to transmit.

Once a coinage system has been introduced, multiple distributions of goods can be arranged easily. A person who has sold his sheep does not need to spend his earnings at the place of the trade but can distribute them across many vendors and purchase a multiplicity of items. Again the improvements of such

operations in comparison to the one-to-one exchanges of the barter-trade are comparable to those brought about through the development of language systems. In the most direct sense, a language user can transmit his message simultaneously to a whole group of listeners; in a remote sense, he has multiple ways of expressing his wishes or intentions and can partition his message into smaller chunks which are presented separately. This possibility is especially important for safeguarding the transmission when individuals with varying linguistic skills are involved in the communication process.

(c) The linguistic system which we have compared with the coinage system might be called a token language. It is founded upon basic forms or elements, such as words, syllables, letters, morphemes or phonemes. Aside from determining its elements, the main goals in the analysis of such a system consist in the description of its syntagmatic and paradigmatic, i.e., temporal-diachronic and spatial-synchronic properties.

A token language system lies half way between the manifold of phenomena of the experienced world and the single token coinage system of the economy. Both systems are reductionistic. Languages use a large set of tokens, i.e., words, to denote the many different objects, events or qualities. However, every token denotes a whole array of similar items. For instance, the word CHAIR denotes many different objects. Moreover, the relations between tokens and the items denoted are of several different types, indicating actor-action, object-location, part-whole, object-class name, and many other relations. The corresponding monetary systems consist, in general, only of one token, e.g., the Dollar, which designates (relates to) every possible item and condition in the same manner. Because, thus, a large manifold is reduced

to just a single element, elaborate forms of operations need to be implemented. This is done by relying on complex numerical properties of the system which capture the large variety of items and conditions by assigning to them corresponding variations in the quantity of tokens, e.g., Dollars. The emerging structure represents an arithmetic formalism.

In comparison to such a single token system, languages consist of many different tokens (frequently called types) and of many different kinds of relations between these tokens and the denoted items. Manipulations with these tokens do not include operations of addition or multiplication but only those of order. By applying order rules recursively, a multitude of expressions can be generated; by applying them to different types of relations this multitude is enriched much further. The emerging structures are topologically rich. Such systems rely on cognitive operations that are mastered by older children only, e.g., on decentration and reversibility. They remain concrete because the tokens, e.g., the words, are thought of as building blocks reflecting directly the conditions of the real or phenomenal world. Just as the coins, these tokens, rather than the commodities which they represent or the labor which produces these commodities, may ultimately come to be regarded as the true objects of the world.

Tokens are selected and retained through social conventions which, moreover, determine the permissible rules of operations. They fail to express the activities and efforts that lead to their creation. As much as the further development of the monetary system advances to a full realization of the transactional character of economic operations, so does modern linguistics

emphasize the interactional character of language. Whereas, traditional linguistics consisted, essentially, in the delineation of linguistic forms and of the rules of their combinations, units such as words, syllables, or letters lose their significance in modern interpretations. What attains significance are clusters of relations representing the activities within and between language users.

The debenture system and the interaction language. (a) Economic history resembles a progression of catastrophies in which, due to ceaseless expansions and lack of constraint, one monetary system after the other has been wrecked. At the terminal points of these progressions, the metal value of coins was reduced out of proportion to its original designation, the confidence in the system was lost, prices skyrocketed, and people were forced to return to the barter system in order to secure their daily needs. At least since the beginning of the 18th century, autocratic rules began to make a virtue out of the pitiful state of their financial systems by abandoning the backing of the currency through silver or gold and by substituting hard coins for paper money.

The first well documented case of such an innovation is that of John Law upon whose advice Louis XV introduced paper money in France. After a few successful years, the confidence in the financial system was lost, leading the nation one significant step closer to the French Revolution. At about the same time, Georg Heinrich von Görtz financed the military adventures of Charles XII in Sweden through the issuing of state certificates. After the King's defeat and death the financial manipulations were violently attacked and Görtz was executed. Nevertheless, all leading nations have since then introduced paper money and, more recently, most industrialized nations have

abandoned the full coverage of their currency by gold or silver or, at least, do not guarantee full convertibility. This shift represents the third major step in the development of monetary systems which we will call the debenture system.

It would be misleading to think of paper money only in terms of the common bills issued by national banks. Of course, these documents are of greatest utility for everyday commerce in comparison to all other certificates and, except for changes affecting the economy as a whole, remain fixed in their values. Similar in kind are bonds issued and guaranteed by national governments, states, and communities as well as by larger industrial and business organizations. Since their value fluctuates with the condition of the economy in general, and with the up and down of the money market in particular, these risks need to be compensated for by the payment of interests. Next in line, stocks fluctuate stronger than bonds. They are backed by commercial or industrial companies but rarely by the government itself. The last extension in the development of paper currencies consists in the utilization of personal checks. Here, each individual attains the role which formerly only a stable government was able to attain, namely to guarantee the value of such transactions.

The last steps in the history of monetary systems, thus, represent another stage of operations and symbolic representations. Written statements become substitutes for standard units of rare metals which, in turn, served as substitutes for the items to be exchanged or, at first, as direct objects of trade. During the earliest stage in the history of trade, exchanges were tied to the given items and to the persons interacting in a particular locality. With the introduction of coins, exchanges could be temporally delayed, could

be executed along extended chains of participants, and could reach simultaneously an array of different vendors. Although this increase in flexibility led to advances in the volume of trade, the expansion remained limited because the total amount of rare metals backing the economic transactions increased only slowly. With the shift toward various forms of paper money, this limitation was abandoned and the monetary system was explicitly tied to the sum total of activities in which a whole nation, an industrial complex, or, lastly, a single individual was, is, or was to be engaged.

The explicit return to a standard set by the activities and labor of an individual or groups of individuals represents only a superficial shift. As emphasized before, the objects of trade have always been the efforts necessary for producing particular goods rather than the merchandise itself. Even the gold and silver accumulated in the treasuries of states represents, basically, the efforts and work by their people. Because of the static character of these financial units it appears, of course, as if the wealth attained had been once and for all removed from the activities that produced it. The deteriorations of such financial systems, whenever the growth in productivity failed to keep pace with the increase in monetary volume, show, however, that such a stability is rather fictitious.

The apparent accumulative and static character of economies based on coins makes them closely similar to linguistic systems which emphasize linguistic elements, such as words, syllables, letters, morphemes or phonemes, and which failed to consider language as a system of activities and interactions. While the proto-economy of the barter trade implies too little symbolization to make it closely comparable to language, the intermediate system of coins, because

of its elementalistic notions, is about equally inappropriate for such a comparison. An adequate understanding of language can be achieved only through comparisons with the debenture system which is based upon matrices of transactions rather than upon classes of fixed elements.

The power of commercial and industrial operations in modern economic systems is not so much determined by the amount of hard currency or cash but by the diversification and the speed with which limited assets are transformed and retransformed. The worth of money is determined by its owner's ability to utilize it productively. Stored money is of lesser value and, indeed, lessening in value as a function of continuing inflation. While such operations also characterize the more advanced stages of the coinage system, the latter remains more firmly anchored to the amount of cash available to the operator. The opportunity of obtaining loans upon written declarations, of investing them immediately in new financial operations, of transferring the profit to cover commissions, and to obtain new resources for investments characterize the effectiveness of the debenture system. In the extreme--and there exist numerous documented cases of this type of operation, many bordering on illegality--a financial operator might gain large profits without much or without any firm financial basis, only through quick transactions of fictitious capital. In this extreme form, the debenture system, through the transactions which it facilitates, has lifted itself from its foundation. It has become a pure system of interrelated activities. The cash which, presumably, buys these activities and the products which they generate have become of negligible importance.

(b) In modern linguistics, beginning with Sapir, Jesperson, and the Prague School, the study of transactions, likewise, has overpowered the study of forms.

Already Jesperson emphasized that the purpose of a linguistic analysis is "to denote all the most important interrelations of words and parts of words in connected speech . . . . Forms as such have no place in the system [Jesperson, 1937, pp. 13 and 104]." More recently, this idea has been expressed in the transformational grammar of Chomsky (1965), in Piaget's (1963, 1970) cognitive developmental psychology and in the structuralism of Levi-Strauss (1958). In Chomsky's theory, transformations relate deep structure components to the surface structures of languages. As for Piaget, the language-using individual is actively participating in these transactional processes. These operations are confined, however, to the organism himself. An interaction with external, e.g., social forces, is deemphasized if not disregarded in both theories.

Undoubtedly, Chomsky's theory has profoundly shaken the traditional, elementalistic and parallelistic views of linguists and psychologists with their undue emphasis upon external physical stimuli and mechanical physical reactions of, essentially, passive organisms. Piaget, like Chomsky, has strongly emphasized the transactional character of psychological operations. He, indeed, seems to draw the final conclusion of such an interpretation by stating that "Transformations may be disengaged from the objects subject to such transformations and the group defined solely in terms of the set of transformations [Piaget, 1970, pp. 23-24]."

Both Chomsky and Piaget have stated their theories in mentalistic and idealistic terms. While such an orientation has set them clearly apart from most American psychologists, they have failed to assign an appropriate role to the cultural-historical conditions into which an individual is born and within which he grows. The environment is regarded as passive. All learning and

development is initiated and directed by the organism. To attain his goals, the individual needs, of course, information and material from the outside. There is no place in these theories, however, for an active role of the environment and for a codetermination of an individual's development by other active organisms. It is at this juncture where a comparison with economic theories becomes most pertinent because these theories bypass and advance far beyond modern interpretations of language and cognitive development.

For a complete understanding of cognitive and linguistic operations, we have to consider two interaction systems. One related these operations to their inner basis, to their physiological, biochemical foundation. The other represents the interactions with the cultural-historical environment into which an organism is being born. While the latter system is realized in theories of economic operations and in the symbolic interactionism of Mead, the former system is expressed--though incompletely--in the theories of Piaget and Chomsky. An advanced synthesis of both interaction systems has been proposed by Rubinstejn (1958, 1963; see also Payne, 1968; Riegel, 1972; Wozniak, 1972).

Rubinstejn extended, on the one hand, the first interaction system by relying on Pavlov's work. He introduced the second interaction system by relying on Vigotskij's (1962) work and, thereby, on the historical materialism of Marx, Engels and Lenin. The psychic activities of an organism are seen as the changing outcome of these two interaction systems, one tying them to their inner material, biochemical foundation described in terms of relations within the nervous system and sensory and motor organs, the other tying psychic activities to their outer material, cultural-historical foundation described in terms of relations between individuals and society. Behavior is seen as

an activity continuously changing in the process of interactions. It is not a thing-like particle that can be separated from these transactions. Language, likewise, is an activity, founded through the two interactions which, in particular, serves to integrate nervous activities and cultural-historical functions. It should be studied as such a process rather than as a conglomeration of particles or forms which are the rigidified abstractions from relational activities.

In order to carry Rubinstejn's program to its systematic conclusion, it would be necessary to devise a methodology and theory of those relations upon which the interactions of the human being and the cultural-historical conditions are based. In other words, the "reflexology" of Pavlov's first signaling system which explores the interactions of the organism with its inner, biological basis needs to be supplemented by a "relationology." In the following part, a brief sketch of such a program for the study of language and its acquisition is given.

Semantic Activities: The Basis for Language Development

Psychologists studying language often regard it as one of their most important tasks to define the elements of their analysis. Many of them settle quickly on words or syllables as basic units if not on the infamous nonsense syllable. To linguists, however, words as well as syllables pose grave problems. But their superiority is only superficial, if they do nothing else but choose different, although more sophisticated, elements for their analysis, such as morphemes or phonemes. Linguists do not always feel compelled to overcome such particle models of language. Of course, once these units have been defined, the scientists will proceed to explain how they are

arranged into larger sequences. In psychology, associations have traditionally provided the necessary bonds. Eventually, it was hoped, science would be able to reconstruct the complexity of immediate experience. While in all these interpretations elements are regarded as prior to their connections, we will argue for the priority of relations over elements. Such a shift in interpretation represents a renewed emphasis on the language users and on common, meaningful, phenomenal experience.

Extralingual relations. Whenever information is exchanged it consists of connected and never of isolated terms. Thus, when we explain the word ZEBRA to a child, we say "(a) zebra (has) stripes" or "(b) zebra (is an) animal" and even if we use nothing but the word ZEBRA we, most likely, point to a "real" zebra or to the picture of one. Thus we are invoking a special, extralingual relation between a label and the object denoted by it, which we will call "ostensive relations." On some other occasions we may utter single words like GO or STOP, expecting that the child will perform the requested actions. The role of commands and demands has received considerable attention in studies of classical conditioning by Pavlov and is basic to Skinner's interpretations of verbal behavior. However, these "intensive relations" are rarely considered in studies of language development. Finally, a third type of extralingual relations is invoked when a person utters, usually in an idiosyncratic manner, some words or sounds such as BRAVO, OUCH, etc., thereby indicating his emotions or feelings. Many theories on the origin of language, beginning with one proposed by Darwin, have focused upon such connotative or "expressive relations." However with few exceptions little attention has been given to this topic in studies of language acquisition.

All three extralingual relations (ostensive, intensive, expressive) are important for the initiation and control of psycholinguistic performances but their significance decreases during the later periods of development. The vast majority of information consists of intralingual relations, e.g., relations between words which are one step removed from their nonlinguistic basis.

Mutual dependence of elements and relations. An apparent difficulty in relational interpretations is the circularity of the concepts of elements and relations. But the problem is not different from analytical geometry, where a point (representing an element) is defined as the intersect of two lines (representing relations), and where at the same time, a line is defined as the connection between two points. Thus in both cases it becomes a matter of choice of where one enters the cycle and from what place one begins to unravel the issues.

Traditionally, an elementalistic viewpoint has dominated the natural as well as the social sciences. By disregarding the contextual implications, psychologists, thereby, have brought themselves into the unfortunate position of having eliminated meaning from their consideration, i.e., those aspects that ought to be of greatest interest in their analysis of language acquisition and use. Elements in isolation are completely meaningless much like the ideal nonsense syllables of the psychological laboratory. On the other hand, relations, like the reflexes in Pavlov's view, are smallest, though idiosyncratic, units of meaning. Since it is inconceivable that human activity can ever be completely without meaning (at least from the actor's own point of view), relations represent the immediate information given or produced; elements are constructed and derived.

Intersection of relations. If relations are combined, two intellectual operations can take place: The meaning of the element at the intersection can be explored (i.e., a word can be identified) and/or the free elements of the intersecting relations can be recognized as members of a class. Both processes involve an abstraction from the immediate information given, the relations. Both processes may occur simultaneously. However, if one of the elements or if the particular types of relations are unfamiliar to a person, considerable time might be required for completing these processes.

Two relations can be combined in no more than four different ways. The first combination aligns two relations opposite in directions. It represents a trivial loop or reverberation. If relations would combine in this manner only, for instance, if the word BLACK would always lead to WHITE and WHITE always to BLACK, then no relational structure would exist. Fortunately, psycholinguistic relations never combine exclusively in such a trivial manner but always reveal sufficient variation in their arrangements.

Chaining	Stimulus Equivalence	Response Equivalence
$S_1 \rightarrow R_2$; $S_2 \rightarrow R_3$	$S_1 \searrow$ $\quad\quad R_{1,2}$ $S_2 \nearrow$	$\nearrow R_1$ $S_{1,2}$ $\searrow R_2$

The three remaining combinations of two relations shown above are identical with the chaining, the response equivalence and the stimulus equivalence paradigms (Jenkins & Palermo, 1964). The first attaches one relation at the end of the other. If nothing else but such chaining paradigms were prevailing, a language would consist of idiosyncratic strings. More likely, various chains

will criss-cross each other, thus, lending transient strength to the network of relations of which a language is made up. The last two paradigms, in particular, allow for the identification of the intersecting element and for the recognition of classes. In the response equivalence paradigm two relations diverge from a common left hand term, leading, in the sample below, from COW to DRINK and RUN. Both right hand terms explicate--we maintain--the meaning of COW. In the stimulus equivalence paradigm, two relations converge upon a shared right hand term, e.g., leading from COW and HORSE to RUN. Both left hand terms explicate the meaning of RUN (see Quarterman & Riegel, 1968; Zivian & Riegel, 1969). If more than two relations are combined, considerable variation in the patterns results. The methodology for analyzing such networks has been considerably advanced during recent years (see Harary, Norman & Cartwright, 1965; Sokal & Sneath, 1963).

Reductionistic and discriminative aspects of language. When a linguist explores an unknown language, he needs to rely on extralingual relations. Except for the rare case of unequivocal proper names, there will always be a large range of items denoted by a common label but varying in many attributes. If this were not so, the language would be nonreductionistic. Only when numerous items are commonly labeled does a language become an efficient means for communication. Consequently, for any term, the linguist needs relational information under numerous conditions in order to gain an understanding of the full range of its meaning.

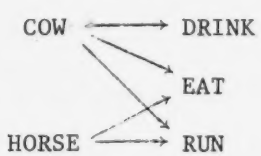
Often, the linguist's task has been compared with that of a child acquiring his first language. Such comparison would be simplistic, if we were to restrict it to information reduction through labeling. Concurrently with

such performance, single objects, events, or qualities are denoted by different labels. For instance, a child might be called BOY, LAD, PAUL, SMITH, NAUGHTY ONE, etc. The choice of the label varies with the situation and depends upon the particular discrimination aimed for. An item might be called THING (if there are no other relevant items), BLOCK (if there are also beads and marbles), BLACK ONE (if there are red and white items), etc. The exclusion or disregard of attributes is often as important as the positive denotation of an item (see Trabasso, 1970). Moreover, the discriminating use of labels makes their application more productive than when their function was exclusively reductionistic.

In terms of our interpretations, the reductionistic character of language is represented by relations diverging from the label and pointing toward the set of denoted objects, events, or qualities. The discriminative character, on the other hand, is represented by a set of labels converging upon a single object, event, or quality. Reductionistic and discriminative properties of language co-exist dialectically. The same is true for the related issue of identifying the meaning of a word or of recognizing a class. The first implies the focusing upon a single term from which several relations diverge; the latter implies the focusing upon members of a distribution many of which might be linked to a single item, e.g., their class name, and all of which are linked to some shared items, e.g., shared functions, parts, locations, etc.

Criteria for classes. Many psychologists regard the stimulus and the response equivalence paradigms as sufficient conditions for the determination of classes. However, these two paradigms represent minimal criteria only because they imply that any two items elicited by a common stimulus or leading to a common response would form a class. They are also abstractions because,

in such simple forms, they occur under laboratory conditions only. In concrete situations, a multitude of combinations are superimposed and embedded in one another, making up the complex network of the natural language and, thereby, strengthening the classes at varying degrees. But because of their abstractness, these paradigms, next to simple relations, may serve as units into which this network can be partitioned.



The superposition of the paradigms can be demonstrated by the example shown above. If a child has learned that COWs DRINK, EAT and RUN and that HORSEs EAT and RUN, he has formed a network of relations involving two semantic classes. COW is a stimulus for three response equivalence paradigms involving the terms: DRINK/EAT, EAT/RUN, DRINK/RUN, respectively. HORSE is the stimulus for one response equivalence paradigm: EAT/RUN. Furthermore, EAT and RUN, respectively, are the responses for the two stimulus equivalence paradigms both involving COW/HORSE.

Undoubtedly, both the classes of right and of left hand terms are more firmly established than when only a single response or a single stimulus equivalence paradigm was involved. The strength of classes might, indeed, be determined by enumerating the number of stimulus or response paradigms embedded in the more complex display (see Riegel, 1970). Once classes have attained a certain strength, a child might generate novel utterances without

ever having been exposed to them before, e.g., in the example above, the child might realize that HORSEs DRINK.

Types of intralingual relations. Thus far we discussed general procedures for identifying the meaning of words and for determining word classes but we have not given any thought to the types of relations involved. Apparently, many types of relations are conceivable and, most important, will lead to different classifications. Thus, ZEBRA together with TIGER, CANDY-STICK and BARBER-SIGN are forming a class sharing STRIPES as a common part or quality. On the other hand, ZEBRA will be categorized with ELEPHANT, NEGRO, and NILE, all of which are located in AFRICA. Thus, different relations lead to only partially overlapping categories. This result, in our opinion, is the main reason why philosophers, linguists and psychologists have failed, so far, to develop and to operationalize comprehensive semantic interpretations.

The above problems are further complicated by the mutual dependence of classes and general (class) relations. This difficulty is similar to the circularity in defining elements and simple relations. Classes, as we have argued, consist of those elements that share certain relations such as actor-action relations. On the other hand, we might conceive of a class of animals and of a class of actions which, in conjunction, define the general relationship between them. These two ways of looking at classes and general relations correspond to the alternative principles elaborated by Dedekind (1893) and Frege (1903) respectively.

When considering developmental progression, however, it seems unlikely that the recognition of general relations precedes the recognition of classes. Once simple relations are given, classes can be derived; once classes are derived, the general relationship between them can be apprehended. Such a general

relationship does not represent anything more than the totality of all simple relations between each member of one class and each member of the other class. Similar to the concept of classes, no surplus meaning ought to be attached to the general relations between classes.

Relying on Piaget's interpretations (Inhelder & Piaget, 1958), we have previously (Riegel & Riegel, 1963) categorized general relations into three groups: (1) Logical relations between the words themselves and derived by verbal abstraction, such as synonymity, superordination, coordination, and subordination. (2) Infralogical or physical relations based on the denoted objects, events, or qualities and derived by abstracting features from these physical items such as parts, wholes, locations, preceding, contemporaneous, or succeeding events. (3) Grammatical relations derived from the phenomenal (surface) structure of linguistic expressions and representing concatenations between the major parts of speech, i.e., nouns, verbs and modifiers.

The above list of general relations is neither exhaustive nor independent. It needs to be supplemented on the basis of more abstract considerations leading to the classification of relations into those that are: Symmetrical vs. nonsymmetrical, transitive vs. nontransitive, reflexive vs. nonreflexive, etc. (see Carnap, 1928, p. 21). Our list may also be supplemented by semantic relations discussed in Fillmore's (1968) case grammar and in the developmental studies by Bloom (1970).

Implicit and explicit relations. If we receive the abbreviated messages: ZEBRA → ANIMAL, ZEBRA → STRIPEs, ZEBRA → RUNs, we not only have four different words at our disposal but the implicit relational information of superordination, whole-part, and actor-action. The failure of a particle

model of language to deal adequately with both semantic and syntactic interpretations is necessitated by the disregard for this relational information. Thus far, our discussion has been concerned with relations implied in meaningful combinations of words (and strictly speaking, all combinations of words are meaningful). An implicit relation is unique for the words which it connects; it is general if many words are combined in the same manner, i.e., if the left hand and right hand elements are members of two different classes.

The transmission of relational information would be insufficiently safeguarded if no other and partially redundant clues were built into the natural languages. Thus, instead of the abbreviated messages listed above, we usually receive phrases like, "The zebra is an animal" or "The stripes of the zebra" or "The zebra runs." In these examples, the auxiliary IS (used as a proper verb) plus the indefinite article AN explicate the logical relation of superordination; the definite article THE and the preposition OF explicate the infralogical relation of whole-part; only the grammatical relation of actor-action does not receive any further explication except for the inflection, s, marking the verb. We call these explicit clues redundant, because they do not occur regularly in the "telegraphic" speech of young children. Apparently, implicit relational information is prior to its explicated form.

The significance of our last statement is underscored when we realize that many single words have inherent relational features. Such implicit relationality is most strongly exhibited among adjectives and adverbs whose role of modifying nouns and verbs necessitates this feature. Their relationality is further extended through the use of comparative constructions which make this part of speech an exceptionally rich topic for a relational analysis (see Clark, 1970; Huttenlocher & Higgins, 1971; Riegel, 1973). Also, verbs

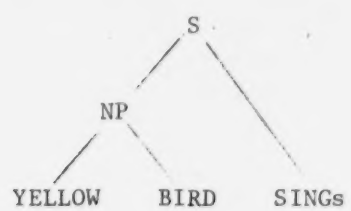
relating to noun subjects and/or to noun objects imply such relationality, e.g., PUSH, PULL, GIVE, TAKE, etc. With the exception of professional and kinship terms, e.g., FOREMAN, UNCLE, BROTHER, etc., such implicit relationality is not very common among nouns, however.

Compounding of relations. With our discussion of explicit relations we have, finally, reached areas of inquiry traditionally explored by linguistics as the foundation of language. In contrast, our own discussion did not begin with an elaboration of these abstract structures but was founded upon the concrete experiences and activities of the real child. Throughout, the order of our topics corresponded to the natural order in which a language is acquired. After sufficient relational information is obtained, the child may identify elements as well as classes. Next, explicit relational clues, such as the prepositions, will be utilized and the child will, increasingly, obey the proper sequential order of semantic classes. At this moment the child is still not operating within syntax of the linguists because he has not yet a sufficient grasp of the more abstract grammatical classes nor of the rules of their combination and transformation. He will be ready for these operations when the classes and class relations available to him have become sufficiently general. With few exceptions, semantic classes are subsets of grammatical classes and, without exception, semantics is prior to syntax.

When two or more elements co-occur regularly, the relations involved may begin to function as elements of a higher order. Such a stratification occurs, for instance, when words are compounded, such as yellow-bird, store-keeper, window-pane, etc. These conditions can be depicted by bracketing, i.e., (YELLOW → BIRD). Subsequently, a telegraphic sentence could be expressed as

(YELLOW → BIRD) → SINGs, in contrast to the original formula YELLOW → BIRD: BIRD → SINGs.

The possibilities provided through compoundings are not limited to words but lead us directly into questions of semantic and syntactic levels, strata, and hierarchies. The above example represents, indeed, the combination of a noun-phrase, NP, i.e., YELLOW → BIRD, with the verb SING. Instead of bracketing, Chomsky has preferred to depict hierarchical organizations by tree diagrams:



Thus, our example provides the important connection with the topic of syntactic structures and their acquisition during childhood (see McNeill, 1970a,b; Slobin, 1971).

Relations of relations. In spite of their concern with language structure, psycholinguists have paid little attention to what we might call relations of relations or the logical connections of relations. Two relations, as discussed above, can be monotonically combined leading to the derivation of classes such as "animals" and "animated actions." They can also become a part of more complex expressions. For this purpose, connectors need to be introduced. Mainly two types of function words serve such connective purposes: conjunctions and relative pronouns. In particular, symmetrical conjunctions (AND, TOO, ALSO, AS WELL AS, etc.) and relative (asymmetrical) pronouns (WHICH, WHO, and THAT)

express--in analogy to our former distinction--logical relations of coordination and superordination-subordination as in the following examples:

Coordination:	(EAGLE → FLIEs) and (RABBIT → RUNs)
Superordination-Subordination:	(RABBIT → RUNs) which (EAGLE → HAUNTs)
or	RABBIT which (EAGLE → HAUNTs) → RUNs

Asymmetrical conjunctions (IF...THEN, BECAUSE, BEFORE, AFTER, etc.) and relative adverbs (WHERE, WHEN, WHY, etc.) generate infralogical relations between relations and represent spatial, temporal, causal and other physical conditions as in the following examples:

Spatial:	(HOUSE → BURNs) where (JOHN → LIVEs)
Temporal/Causal:	(CORN → GROWs) after (SUN → SHINEs)
	if (EAGLE → FLIEs) then (RABBIT → RUNs) etc.

In spite of the lack of evidence, these logical and infralogical relations of relations are prior and of greater importance in the language acquisition process than any syntactic structures reflecting formal and abstract linguistic conventions. Since permutations within logical and infralogical structures produce, in most cases, changes in interpretations, such a "syntax" is more fundamental than the aspects of syntax commonly analyzed by linguists. The child will have to learn how to operate with logical and infralogical combinations; as a by-product he generates sentences that incorporate words according to their syntactic rules.

Psycholinguistic systems. If, instead of elements and simple relations, we discuss classes and general relations, we shift from what Chomsky has

called finite state grammars to phrase structure grammars. Of course, such an extension is not limited to syntax but, more important from our own point of view, holds for semantic systems as well. Instead of proposing simple relations such as RABBIT → RUNs, EAGLE → FLIEs, and of elaborating different types of combinations, we argue, now, in terms of semantic classes, such as "animals," "food," "toys," "animated actions," etc., and in terms of general relations which not only link but also define these classes. Since there are no nonoverlapping semantic classes, only the most formal and abstract features of the language, namely those of syntax, have been described in an unambiguous manner. But even here, multiple classifications often outweigh unique assignments. The ambiguities of semantic classifications may seem disturbing, but they also guarantee the richness of linguistic expressions and the creative potential of the language.

Rules for combining semantic or syntactic classes are more general than rules for chaining simple relations. While thus, the resulting semantic and syntactic systems are more powerful, Chomsky regards them as almost equally insufficient because they do not consider transformational operations. Although transformational systems might be still more comprehensive than the other models, it is well conceivable that these various semantic and syntactic systems coexist in the child and that large portions of his language skills might be sufficiently explained by systems of classes and general relations or even by transitional probabilities without invoking more complex operations.

Inversion and negation. A language model based on classes and general relations accounts for the well documented generative skills of children

(Brown & Fraser, 1963; Stern & Stern, 1907; Weir, 1962) but it does not handle operations of intellectual shifts or reversals (Riegel, 1957) which, recently, have been discussed under the topic of deixis (see Bruner, 1972; Rommetviet, 1968). When we identify an object or a term, we always do so at the expense of others with which the target item is contrasted. Only during the very early stages of intellectual development, i.e., during the sensory-motor period in Piaget's theory, does the child focus upon singular items. In most instances, the contrastive disregard of information (Trabasso, 1970) is as important as the positive identification of the item itself.

Recently, Olson (1970) has given a cogent analysis of this problem. By hiding a small paper star under blocks differing in several attributes the verbal identification of the target item varies with the alternatives given. In one situation we might merely say that the star is under the block (if there is only one block within a set of other objects); in another we might say that it is under the black one, the round one, the large one, etc., dependent upon the alternatives given. In the language of set theory, the identification of a concept A also involves the recognition of its inverse A', both of which together compose the superset B in the form $A + A' = B$.

The problem becomes more complex if the discrimination occurs along several dimensions at the same time. For instance, if the child has to operate within the dimension of red vs. nonred and wooden vs. nonwooden he might again discriminate red blocks from all others or wooden blocks from all others by disregarding each time the second of the two interacting attributes. However, he might also be asked to form combinations, such as red and wooden; red but not wooden; wooden but not red; neither red nor wooden.

Since psycholinguistic information is mostly positive, our discussion has been somewhat academic. Commonly, we describe an item by listing several, preferably, criterial features, rather than by informing the listener what an item is not. For example, we are telling a child that a "ZEBRA is an ANIMAL with STRIPES," rather than that "a ZEBRA is not a PLANT and does not have DOTS." We choose the positive strategy because complementary sets are often ill-defined and vary from situation to situation. Moreover, human subjects seem to be better able to handle positive rather than negative information (see Bourne, 1970; Bruner, Goodnow & Austin, 1956; Wason, 1959).

Due to the traditional emphasis upon cognition, the role of negative information has been insufficiently explored by psycholinguists. As soon as we focus upon language as a means for the initiation and control of nonverbal actions, motivations, and emotions we will be impressed by the significant role of negation in form of inhibition, repression and denial. These noncognitive aspects of language provide important connections with other major areas of psychological inquiry, such as physiological, personality and social research and theories. The concept of negative information also enters into consideration when we extend our discussion of classes to those of ordered relations. Within such models, negations of ordered or partially ordered subsystems represent the operation of transformation.

Transformations. In discussing transformations, it is useful to refer briefly to mathematics where this concept has been rigorously applied. Mathematical systems consist of sets of axioms defining possible operations with symbolic elements, such as numbers. As elaborated by Hölder (1901) and more recently discussed by Stevens (1951), Coombs (1964) and others, the simplest

number system defines nominal scales which, when applied to observations, allow for the categorization of items in distinct classes to which, in turn, labels, such as words, letters or numerals may be assigned. Since there exists no order between the classes, the degree of transformation is almost unlimited and consists in the relabelling of the classes and their members. Differing from linguistics, however, logical or mathematical transformations keep the significant properties of the system invariant, i.e., the classes remain the same even though their labels have changed. When additional axioms on the transitivity of the operations are imposed, ordinal systems are generated. Subsequently, logical or mathematical transformations, in keeping the order invariant, are more restricted than those applicable to nominal systems. Ordinal scales might be monotonically stretched or compressed but the order of any two items may not be altered.

Unfortunately, linguists have used the term transformation in precisely the opposite sense. Linguistic transformations, in producing variance, gain importance the more complex the system to which they are applied. In categorical systems they lead to the identification of the inverse of classes. In ordered systems, such as in various types of syntax, they imply rearrangements of these classes which, most often, require changes in interpretations. Linguistic transformations deal with the reordering of sequences of classes or, at a lower level, of elements, by which, for instance, declarative statements are changed into questions, passive statements, negative statements, and vice versa, or by which deep structure phrases are converted into surface structure expressions and vice versa.

Concluding Remarks

With our brief reference to linguistic transformations, we have returned to the main issues of the first part of our chapter in which we tried to demonstrate that a purely transactional analysis is conceivable and has been successfully implemented in economic operations. Language, likewise, ought to be regarded as an activity and not merely as a system of particles or tokens, products or commodities. Such a conclusion, if accepted, does not contradict our analysis in the second part of our chapter where we emphasized the relational, transactional character of linguistic operations. In the following summary, we attempt, once more, to show the congruence of these two aspects of language development.

At the protoeconomic level, trade consists in the exchange of particular items on a one-to-one basis and is bound to a given situation. Such a system is concrete with little symbolic representation. But the items exchanged are not to be viewed as having thing-like, substantive character; what is exchanged are the activities and the labor necessary to produce them. Similarly, linguistic operations at this level involve extralingual relations between labels and objects, internal states or--most important--actions. If a comparison with Piaget's developmental levels is attempted, the protoeconomic and the protolinguistic systems are characterized by sensory-motor activities.

The next economic system is comparable to the level of concrete intellectual operations. It relies on standard commodities represented by concrete materials or objects, e.g., gold or silver, and allows for a wide range and much more flexible operations, such as sequential and multiple distributions of traded goods, as well as for advance storage and delayed actions. The conceptual

danger of such a system lies in the tendency to regard its basic monetary unit as fixed, universal entities. History has repeatedly shown that this apparent stability is easily shattered as the basis of activity, representing the labor and efforts by the participating people, is brought at variance with the standards of the system.

Traditionally, similar viewpoints have dominated psychology and linguistics, namely the view that language consists of sets of basic units, such as words, syllables, letters, morphemes or phonemes, from which the more complex forms are derived. Thus, the view of language as an activity and a process is either disregarded or lost. Just as different currencies represent different monetary systems, so do different sets of linguistic elements represent different languages or dialects. Thus, there exists variability and between them (linear) convertibility or (nonlinear, transformational) translation. The universal basis of different linguistic systems is represented by the protolanguage of the preceding level with its notion of the identity of operations. Correspondingly, the protoeconomy of the barter system represents the universal features of the more advanced trading operations based upon property rights. At the second economic level, more specific rules have to be implemented determining the standard, the order, and the distribution of exchanges. Likewise, at the second linguistic level, more specific lexicological conventions and syntactic rules of order and restitution are required.

Only at the third stage of development does an analysis of the economic system advance our understanding of linguistic systems to a significant degree. Monetary forms characteristic for this stage and represented by certificates, bonds, stocks, and checks are representational units of exchange. They help

us to realize that it is not the object nor any particular material, such as rare metals, which are exchanged but the labor and activities of people producing these objects and operating with these documents. Transactions on such elusive bases require explicit rules of conduct of which only a minor portion concerns the specific relationship of these certificates to the objects of trade. Most of them deal with intraeconomic relations.

The conditions are similar in linguistic operations. Only when we realize that linguistic units, such as words, syllables, or letters, are mere abstractions from the stream of operations that characterizes language, do we gain a full understanding of linguistic systems. These operations constitute the information immediately given through the interrelating activities of communicating individuals. An understanding of these interactions can be gained only if these activities are studied as they are produced and perceived; the products of these interactions are rigidified objectifications that do not capture the constituting activities of languages.

References

Bloom, L. Language development. Cambridge, Mass.: MIT Press, 1970.

Bourne, L. E., Jr. Learning and utilization of conceptual rules. In B. Kleinmuntz, (Ed.), Concepts and structure of memory. New York: Wiley, 1970. Pp. 1-32.

Brown, R., & Fraser, C. The acquisition of syntax. In C. N. Cofer, & B. S. Musgrave (Eds.), Verbal behavior and learning. New York: McGraw-Hill, 1963. Pp. 158-197.

Bruner, J. S. Nature and uses of immaturity. American Psychologist, 1972, 27, 687-708.

Bruner, J. S., Goodnow, S. S., & Austin, G. A. A study of thinking. New York: Wiley, 1956.

Bühler, K. Sprachtheorie. Jena: G. Fischer, 1934.

Carnap, R. Der logische Aufbau der Welt. Hamburg: Meiner, 1928. (Logical structure of the world. Berkeley, Calif.: University of California Press, 1967.)

Chomsky, N. Aspects of the theory of syntax. Cambridge, Mass.: MIT Press, 1965.

Cipolla, C. M. Money, prices, and civilization in the Mediterranean world. Princeton, N. J.: Princeton University Press, 1956.

Clark, H. H. Comprehending comparatives. In G. Flores d'Arcais & W. S. M. Levelt (Eds.), Advances in psycholinguistics. Amsterdam: North-Holland Press, 1970. Pp. 294-306.

Coombs, C. H. Theory of data. New York: Wiley, 1964.

Dedekind, R. Was sind und was sollen Zahlen? (II Aufl.). Braunschweig: Vieweg, 1893.

Fillmore, C. J. The case for case. In E. Bach & R. T. Harms (Eds.), Universals in linguistic theory. New York: Holt, Rinehart and Winston, 1968. Pp. 1-88.

Frege, B. Grundgesetze der Arithmetik. Jena: H. Pohle, 1903. (The basic laws of arithmetic. Berkeley, Calif.: University of California Press, 1964.)

Gaettens, R. Inflationen. Munich: Pflaum, 1955.

Harary, F., Norman, R. Z., & Cartwright, D. Structural models. New York: Wiley, 1965.

Hölder, O. Die Axiome der Quantität und die Lehre vom Mass. Berichte der Sächsischen Gesellschaft der Wissenschaften, Leipzig, Mathematische--Physikalische Klasse, 1901, 53, 1-64.

Huttenlocher, J., & Higgins, E. T. Adjectives, comparatives, and syllogisms. Psychological Review, 1971, 78, 487-504.

Inhelder, B., & Piaget, J. The growth of logical thinking from childhood to adolescence. New York: Basic Books, 1958.

Jenkins, J. J., & Palermo, D. S. Mediation processes and the acquisition of linguistic structures. Monographs of the Society for Research in Child Development, 1964, 29, 141-169.

Jesperson, O. Analytic syntax. London: Allen and Unwin, 1937.

Labov, W. The study of language in its social context. Studium Generale, 1970, 23, 30-87.

Levi-Strauss, C. Anthropologie structurale. Paris: Plon, 1958. (Structural anthropology. New York: Basic Books, 1963.)

Malinowski, B. The problem of meaning in primitive languages. Supplement I. In C. K. Ogden & I. A. Richards (Eds.), The meaning of meaning. New York: Harcourt and Brace, 1923. Pp. 296-336.

Marx, K. Lohnarbeit und Kapital. Berlin: Vorwärts Verlag, 1891.

McNeill, D. The acquisition of language. New York: Harper and Row, 1970. (a)

McNeill, D. The development of language. In P. H. Mussen (Ed.), Carmichael's manual of child psychology. New York: Wiley, 1970. Pp. 1061-1161. (b)

Olson, F. A. Language and thought: Aspects of a cognitive theory of semantics. Psychological Review, 1970, 77, 257-273.

Payne, T. R. S. L. Rubinstejn and the philosophical foundations of the Soviet psychology. New York: Humanities Press, 1968.

Piaget, J. The origins of intelligence in children. New York: Norton, 1963.

Piaget, J. Structuralism. New York: Basic Books, 1970.

Quarterman, C. J., & Riegel, K. F. Age differences in the identification of concepts of the natural language. Journal of Experimental Child Psychology, 1968, 6, 501-509.

Quillian, M. R. Word concepts: A theory and simulation of some basic semantic capabilities. Behavioral Science, 1967, 12, 410-430.

Riegel, K. F. Untersuchung über intellektuelle Fähigkeiten älterer Menschen. (Doctoral dissertation, University of Hamburg, 1957.)

Riegel, K. F. Untersuchungen sprachlicher Leistungen und ihrer Veränderungen. Zeitschrift für allgemeine und angewandte Psychologie, 1968, 15, 649-692.

Riegel, K. F. The language acquisition process: A reinterpretation of selected research findings. In L. R. Goulet & P. B. Baltes (Eds.), Life-span developmental psychology: Theory and research. New York: Academic Press, 1970. Pp. 357-399.

Riegel, K. F. Developmental psychology and society: Some historical and ethical considerations. In J. R. Nesselroade & H. W. Reese (Eds.), Life-span developmental psychology: Methodological issues. New York: Academic Press, 1972 (in press).

Riegel, K. F. Dialectic operations: The final period of cognitive development. Human Development, 1973 (in press).

Riegel, K. F., & Riegel, R. M. An investigation into denotative aspects of word meaning. Language and Speech, 1963, 6, 5-21.

Rommetveit, R. Words, meanings, and messages. New York: 1968.

Rubinstejn, S. L. Grundlagen der allgemeinen Psychologie. Berlin: Volk und Wissen, 1958.

Rubinstejn, S. L. Prinzipien und Wege der Entwicklung der Psychologie. Berlin: Akademie Verlag, 1963.

Slobin, D. The ontogenesis of grammar. New York: Academic Press, 1971.

Sokal, R. R., & Sneath, P. H. A. Principles of numerical taxonomy. San Francisco: Freeman, 1963.

Stern, C., & Stern, W. Die Kindersprache. Leipzig: Barth, 1907.

Stevens, S. S. Mathematics, measurement, and psychophysics. In S. S. Stevens (Ed.), Handbook of experimental psychology. New York: Wiley, 1951. Pp. 1-49.

Trabasso, T. Reasoning and the processing of negative information. Paper presented at the 78th Annual Convention of the American Psychological Association, Washington, D. C., September 1970.

Trier, J. Der Deutsche Wortschatz im Sinnbezirk des Verstandes. Heidelberg: Winter, 1931.

Vigotskij, L. S. Thought and language. Cambridge, Mass.: MIT Press, 1962.

Wason, P. C. The processing of positive and negative information. Quarterly Journal of Experimental Psychology, 1959, 11, 92-107.

Weir, R. H. Language in the crib. The Hague: Mouton, 1962.

Werner, H. Einführung in die Entwicklungspsychologie. Leipzig: Barth, 1926. (Comparative psychology of mental development. New York: Follett, 1948.)

Wozniak, R. H. Verbal regulation of motor behavior: Soviet research and non-Soviet replication. Human Development, 1972, 15, 13-57.

Zivian, M. T., & Riegel, K. F. Word identification as a function of semantic clues and association frequency. Journal of Experimental Psychology, 1969, 79, 336-341.